

CLAIMS

WHAT IS CLAIMED IS:

1. Apparatus for depositing a pattern of fluid material onto a substrate moving in a machine direction, said apparatus comprising:

at least first and second nozzle units substantially  
5 aligned in a direction of alignment;

a delivery system for delivering said material to said nozzle units, said delivery system comprising

a manifold having first and second supply ports located one above the other for supply of material to the nozzle  
10 units, and

a transfer plate disposed between the manifold and the nozzle units, said nozzle units being secured to said transfer plate,

supply passaging in the transfer plate for the delivery  
15 of material from the manifold supply ports to said nozzle units, said supply passaging comprising a first elongate supply channel in a first face of the transfer plate in fluid communication with said first supply port in the manifold, and a second elongate supply channel in said first face of  
20 the transfer plate in fluid communication with said second supply port in the manifold, said first and second supply channels extending in said direction of alignment and being located one above the other in stacked relation; and

a mounting system for mounting said transfer plate on  
25 the manifold, said mounting system allowing adjustment of the position of the transfer plate and nozzle units thereon relative to the manifold in said direction of alignment, said manifold supply ports remaining in fluid communication with respective supply channels during said adjustment.

2. Apparatus as set forth in claim 1 wherein said first and second nozzle units have inlet ports for receiving said material and nozzles for depositing said material on said substrate, and wherein said transfer plate has first and second outlet ports in fluid communication with respective inlet ports, and first and second passages in the transfer plate connecting the first and second supply channels to respective transfer plate outlet ports, said transfer plate outlet ports being located in a second face of said transfer plate opposite said first face.

3. Apparatus as set forth in claim 1 wherein each nozzle unit has an overall width extending in said direction of alignment, and wherein each supply channel has a length greater than said overall width.

4. Apparatus as set forth in claim 3 wherein said supply channels are of substantially the same length and stacked directly above one another.

5. Apparatus as set forth in claim 1 wherein said mounting system comprises at least one elongate slot in one of the transfer plate and the manifold, said slot extending in said direction of alignment, and a fastener extending through the slot for fastening the transfer plate to the manifold.

6. Apparatus as set forth in claim 1 further comprising a first recirculation unit mounted on said transfer plate, said first recirculation unit having an inlet port for receiving said material and an outlet port,  
a second recirculation unit mounted on said transfer plate, said second recirculation unit having an inlet port for receiving said material and an outlet port,  
a control system for selectively directing said material

either to a nozzle unit for deposit of the material on said  
10 substrate or to a respective recirculation unit for  
recirculation back to said manifold, and

a return port in the manifold for receiving material  
from the first and second recirculation units.

7. Apparatus as set forth in claim 6 further  
comprising:

first recirculation passaging in the transfer plate  
comprising a first inflow recirculation passage providing  
5 fluid communication between said first manifold supply port  
and the inlet port of the first recirculation unit, and a  
first outflow recirculation passage providing fluid  
communication between the outlet port of the first  
recirculation unit and the return port of the manifold, and  
10 second recirculation passaging in the transfer plate  
comprising a second inflow recirculation passage providing  
fluid communication between said second manifold supply port  
and the inlet port of the second recirculation unit, and a  
second outflow recirculation passage providing fluid  
15 communication between the outlet port of the second  
recirculation unit and the return port of the manifold,

said first and second outflow recirculation passages  
comprising a common return channel in said first face of the  
transfer plate in fluid communication with said manifold  
20 return port, said return channel extending in said direction  
of alignment and being spaced from said first and second  
supply channels so that all three channels are in stacked  
relation to one another.

8. Apparatus as set forth in claim 1 further comprising:

a first recirculation unit mounted on said transfer  
plate, said first recirculation unit having an inlet port for  
receiving said material and an outlet port,

5 a control system for selectively directing said material

either to said first nozzle unit for deposit of the material on said substrate or to said first recirculation unit for recirculation back to said manifold,

10 a return port in the manifold for receiving material from the first recirculation unit, and

first recirculation passaging in the transfer plate comprising a first inflow recirculation passage providing fluid communication between said first manifold supply port and the inlet port of the first recirculation unit, and a  
15 first outflow recirculation passage providing fluid communication between the outlet port of the first recirculation unit and the return port of the manifold,

said first outflow recirculation passage comprising a return channel in said first face of the transfer plate in  
20 fluid communication with said manifold return port, said return channel extending in said direction of alignment and being spaced from said first and second supply channels so that all three channels are in stacked relation to one another.

9. Apparatus as set forth in claim 1 wherein said first and second transfer plate outlet ports are in a second face of the transfer plate opposite said first face.

10. Apparatus as set forth in claim 1 wherein said first and second nozzle units comprise a first bank of nozzle units for depositing material along a first side margin of said substrate, and wherein said apparatus further comprises  
5 a second bank of nozzle units mounted on a second transfer plate for depositing material along a second side margin of said substrate, said first and second banks of nozzles being adjustable in said direction of alignment toward and away from one another.

11. Apparatus as set forth in claim 1 wherein said direction of alignment comprises a cross-machine direction extending generally transverse to the machine direction.

12. Apparatus as set forth in claim 1 wherein each nozzle unit has a width, the position of the transfer plate and nozzle units thereon relative to the manifold in said direction of alignment being adjustable within a range of up  
5 to at least about the width of said nozzle unit.

13. Apparatus for depositing a pattern of fluid material onto a substrate moving in a machine direction, comprising:

a nozzle unit having an inlet port for receiving said  
5 material and a nozzle for depositing said material on said substrate,

a recirculation unit having an inlet port for receiving said material and an outlet port,

a delivery system for delivering said material to said  
10 nozzle unit, said delivery system comprising

a control system for selectively directing said material either to the nozzle unit for dispensing on said substrate or to the recirculation unit for recirculation,

a manifold having a supply port for supply of material  
15 to the inlet port of the nozzle unit, and a return port for receiving material from the recirculation unit,

a transfer plate having a first face facing said manifold,

first supply passaging in the transfer plate providing  
20 fluid communication between said manifold supply port and the inlet port of the nozzle unit, said supply passaging comprising an elongate channel in said first face of the transfer plate,

first recirculation passaging in the transfer plate

25 comprising a first inflow recirculation passage providing  
fluid communication between said manifold supply port and the  
inlet port of said recirculation unit, and a first outflow  
recirculation passage providing fluid communication between  
the outlet port of the recirculation unit and the return port  
30 of the manifold, said outflow recirculation passage  
comprising an elongate return channel in said first face of  
the transfer plate in a generally stacked relation with said  
supply channel,

the nozzle unit and recirculation unit being attached to  
35 the transfer plate with the inlet port of the nozzle unit in  
fluid communication with said supply passaging in the  
transfer plate, with the inlet port of the recirculation unit  
in fluid communication with said inflow recirculation passage  
in the transfer plate, and with the outlet port of said  
40 recirculation unit in fluid communication with said outflow  
recirculation passage in the transfer plate, and

the transfer plate being mounted on said manifold with  
said supply channel in the transfer plate in fluid  
communication with said manifold supply port and with said  
45 return channel in the transfer plate in fluid communication  
with said manifold return port.

14. Apparatus as set forth in claim 13 wherein said  
supply and return channels are stacked directly one above the  
other.

15. Apparatus as set forth in claim 13 wherein the  
elongate channel and the elongate return channel in said  
first face of the transfer plate each extend in a cross-  
machine direction generally transverse to the machine  
5 direction.

16. Apparatus for depositing a pattern of fluid  
material onto a substrate moving in a machine direction,

comprising:

at least a first nozzle unit having an inlet port for  
5 receiving said material and a nozzle for depositing said  
material on said substrate;

at least a first recirculation unit having an inlet port  
for receiving said material and an outlet port;

a delivery system comprising:

10 a control system for selectively directing said material  
either to the nozzle unit for dispensing on said substrate or  
to the recirculation unit for recirculation;

a manifold having a first supply port for supply of  
material to the inlet port of the nozzle unit, and a return  
15 port for receiving material from the recirculation unit;

a transfer plate secured to said manifold, said transfer  
plate having a first face facing said manifold;

first supply passaging in the transfer plate providing  
fluid communication between said manifold supply port and the  
20 inlet port of the nozzle unit; and first recirculation  
passaging in the transfer plate comprising a first inflow  
recirculation passage providing fluid communication between  
said manifold supply port and the inlet port of said  
recirculation unit, and a first outflow recirculation passage  
25 providing fluid communication between the outlet port of the  
recirculation unit and the return port of the manifold;

the nozzle unit and recirculation unit being attached to  
the transfer plate with the inlet port of the nozzle unit in  
fluid communication with said supply passaging in the  
30 transfer plate, with the inlet port of the recirculation unit  
in fluid communication with said inflow recirculation passage  
in the transfer plate, and with the outlet port of said  
recirculation unit in fluid communication with said outflow  
recirculation passage in the transfer plate.

17. Apparatus as set forth in claim 16 wherein said fluid supply passaging communicates with said inflow recirculation passage at a fluid juncture, and wherein said control system comprises a first valve downstream of said fluid juncture movable between an open position permitting  
5 flow of material through the nozzle of the nozzle unit and a closed position blocking said flow, and a second valve downstream of said fluid juncture movable between an open position permitting flow through the recirculation unit and a  
10 closed position blocking said flow.

18. Apparatus as set forth in claim 17 wherein said control system is operable to move the first and second valves between a material deposit condition in which the first valve is open and the second valve is closed and a  
5 material recirculating condition in which the first valve is closed and the second valve is open, and wherein said control system is operable to move the two valves substantially simultaneously between their respective positions.

19. Apparatus as set forth in claim 17 wherein said first valve is in said nozzle unit and said second valve is in said recirculation unit.

20. Apparatus as set forth in claim 16 further comprising:

a second nozzle unit having an inlet port for receiving said material and a nozzle for depositing said material on  
5 said substrate;

a second recirculation unit having an inlet port for receiving said material and an outlet port;

a second supply port on the manifold for supply of material to the inlet port of the second nozzle unit;

10 second supply passaging in the transfer plate providing fluid communication between said second manifold supply port



and the inlet port of the second nozzle unit, and;

second recirculation passaging in the transfer plate comprising a second inflow recirculation passage providing  
15 fluid communication between said second manifold supply port and the inlet port of the second recirculation unit, and a second outflow recirculation passage providing fluid communication between the outlet port of the second recirculation unit and the return port of the manifold.

21. Apparatus as set forth in claim 20 wherein said first and second outflow recirculation passages comprise a common channel in fluid communication with said manifold return port.

22. Apparatus as set forth in claim 16 wherein said first and second manifold supply ports are located one above the other, and wherein said first and second supply passaging  
5 comprise supply channels in said first face of the transfer plate located one above the other in stacked relation and in fluid communication with respective manifold supply ports, said supply channels extending in said cross-machine direction.

23. Apparatus as set forth in claim 16 wherein said first nozzle unit and said first recirculation unit are attached to a second face of the transfer plate opposite said first face.